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STUDIES IN THE TOXICITY OF BENZENE HEXACHLORIDE

BY

D. W. JOLLY AND G. J. KANE,

COOPER TECHNICAL BUREAU, BERKHAMSTED

INTRODUCTION

Benzene hexachloride (hexachlorocyclohexane) has within recent years come into prominence for the control of ectoparasites, notably ticks and mites. It is predominantly used as a sheep or cattle dip, and, to a lesser extent, as a skin dressing on dogs. However, whilst many workers have reported on its acaricidal and insecticidal efficiency, somewhat incomplete information has been published on its toxicity to animals, especially sheep. The present paper records experiments conducted on sheep and dogs which give some indication of the amounts of benzene hexachloride in single doses required to induce an acute toxic response, the nature of the response, and its effect upon the animal tissues. This work was confined to acute toxicity as the present use of benzene hexachloride in dogs and sheep for the control of ectoparasites is unlikely to induce chronic toxicity.

I. TOXICITY

The isomeric nature of benzene hexachloride (referred to below as BHC) influences its toxicity. The four isomers, alpha, beta, gamma and delta, differ in their toxicity and are antagonistic in their individual effect upon the animal body when BHC as a whole is administered (McNamara, 1947).

The following table, according to Slade (1945), details the composition of BHC and the toxicity of its isomers:—

TABLE I

Isomer	Percentage in Technical BHC	Dosage rate to produce L.D.50 in rats expressed in grammes per kg. and administered by mouth
Alpha ...	70	1·7
Beta ...	5	No effect
Gamma	12–14	0·19
Delta ...	11–13	1·25

The toxic responses involved therefore vary with the proportion of the individual isomers, notably the gamma, which is the most toxic. In the work covered by this paper the technical grade BHC used is regarded as containing 12·5 per cent. of gamma isomer.

Hamilton Kirk (1946), reviewing the work of Cameron and Slade, states that BHC is significantly less toxic than DDT. Wilson (1948) found that cattle will tolerate BHC in oral doses of 0·25 grammes per kg. bodyweight, which would represent the ingestion of about 30 gallons of dip wash at a concentration of 0·1 per cent. BHC. Oral doses of 0·5 grammes per kg. caused the death of some animals. Dogs will tolerate even greater oral doses of BHC, and Batte and Turk (1948) found the equivalent of 0·4 grammes per kg. failed to induce a toxic response; and a toxic response did not always follow doses up to 0·4 grammes gamma isomer (3.2 grammes BHC) per kg. bodyweight.

Absorption through the skin also represents a means by which BHC could gain access into the animal's body. Furman (1947) has shown that skin absorption does occur, although the amount of BHC applied to the skin, which subsequently enters the body, has not been determined. Downing (1947) has shown that the fleece of sheep dipped at 0.1 per cent. BHC is still lethal to *Psoroptes ovis* 82 days after dipping. This residual property of BHC may increase the chances of its absorption.

II. TOXICITY TO SHEEP—EXPERIMENTAL DATA

(*a*) *Oral Administration.*—A 50 per cent. BHC wettable powder was administered by a stomach tube, which consisted of a length of soft rubber tubing of ¼ inch internal diameter. The dosage was estimated on a gramme per kg. bodyweight ratio, and given without prior fasting. The sheep were a year old and maintained on dry feeds in concreted yards. Dosing was completed without incident and the results are detailed in Table II (overleaf).

(*b*) *Toxic Symptoms.*—The toxic symptoms of BHC may be divided into two phases, a period of hypersensitivity, with intermittent convulsions, followed by a period of marked depression. The first phase lasted up to 30 hours, followed by depression for three to four days.

Convulsions appeared as little as 30 minutes after administration of the toxicant, and commenced with a violent backward jerking of the head and neck, during which time the animal moved backwards until it collapsed on its side. In the prone position the sheep was affected with an opisthotonic convulsion similar to that associated with strychnine poisoning. During this seizure the jaws worked rapidly, and there was profuse salivation. The convulsion passed off within three to five minutes, and the animal was able to stand. These convulsions were most frequent four to six hours after dosing, and during this period recurred every five to seven minutes. Other toxic symptoms shown were polyuria, interference with vision in five out of nine affected sheep, and inco-ordination. Death usually occurred from six to nine hours, although sometimes delayed to 12 to 18 hours, and was apparently due to respiratory failure.

(*c*) Post-mortem *Findings.*—The abomasum and intestines showed areas of congestion in some cases extending to the caecum and colon. The kidneys were congested, and petechial haemorrhages were noted in the epicardium and endocardium. A cystitis was observed in the one sheep receiving a dose of 3 grammes per kg.

III. THE APPLICATION OF BHC TO THE SKIN

These trials were conducted in association with general investigations into the control of sheep tick, *Ixodes ricinus*,

TABLE II

BHC TOXICITY TRIALS ON SHEEP

Formula: BHC ... ... 50 per cent.
China clay ... 45 „
Copacite ... 5 „

BHC dosage in grammes per kg. body-weight	Dose (grammes)	Sheep weight (kg.)	Observations	Remarks
0·05	2·925	29·25	Normal	No effect
0·05	2·43	24·3	„	„
0·1	6·48	32·4	„	„
0·1	5·04	25·2	Inclined to be restless for six hours	? reaction
0·25	15·75	31·5	Intermittent convulsions for six hours. Depressed with occasional periods of excitement for two days. Recovered	Toxic reaction
0·25	17·1	34·2	Intermittent convulsions for 30 hours, after which the animal was depressed for two to three days. Defective vision	Toxic reaction
0·5	46·8	46·8	Intermittent convulsions, blindness and death in 12 to 13 hours	Lethal
1·0	72·0	36·0	Intermittent convulsions, blindness and death in 8¼ hours	„
1·0	97·2	48·6	Intermittent convulsions, blindness and death in 8¼ hours	„
1·5	113·4	37·8	Frequent intermittent convulsions, and during the later stages the animal was too exhausted to rise between the convulsions. Death in 6 hours	„
2·0	151·2	37·8	Frequent intermittent convulsions. Death in 8 hours	„
3·0	226·8	37·8	Infrequent and mild convulsions becoming more acute. Blindness and death in 12 to 18 hours	„
Inert control 3·0	*71·55	23·85	Normal	No effect

*Formula: China clay ... 90 per cent.
Copacite ... 10 „

and took place in April and May. The work was conducted on Blackface and Cheviot ewes and lambs on hill pastures. A suspension type dip containing 50 per cent. BHC was used. Details are tabulated below.

TABLE III

Strength BHC	Animals and numbers	Method of application	Results
5 per cent. suspension	5 sheep	Spray to head, ears, axillae and thighs	No ill effects
2 per cent. suspension	250 „	Dipped. Time of immersion 15 to 20 seconds	„
2½ per cent. suspension	Approx. 1,000 lambs	Applied within 24 hours of birth to ears, axillae and thighs	„

IV. Toxicity to Dogs—Experimental Data

(*a*) The BHC was administered by mouth in gelatine capsules. Each capsule contained 1 or 2 grammes of technical BHC, which had previously been ground to a fine powder. There was no previous fasting and the dogs accepted milk and biscuits an hour after dosing. The results are detailed in the following table.

TABLE IV

BHC TOXICITY TRIALS IN THE DOG

Formula: Technical BHC—100 per cent.; administered in capsules

Grammes per kg.	Dose, grammes	Dog weight kg.	Observations	Results
0·32	4	12·5	Nervous tremors. Convulsions. Recovered.	Reaction
0·33	4	12	Restless. Recovered	Slight reaction
0·45	8	17·5	Nervous tremors. Recovered	„
0·5	6	12	Nervous tremors. Convulsions and depression. Recovered	Reaction
1·0	17	17	Nervous tremors and depression. Recovered	„
1·03	14	13·5	Nervous tremors. Convulsions and depression. Recovered	„

(*b*) *Toxic Symptoms.*—Toxic symptoms in the dog followed the same general pattern as that observed in sheep. A phase of nervous excitement occurred with occasional convulsions, lasting 12 to 18 hours, after which the dogs were depressed for four to five days. The early signs of the toxic reaction, which commenced three to four hours after dosing, were restlessness and hypersensitivity. Later a jerking of the head and shoulders was observed, becoming more pronounced, and associated with jaw movement and salivation. Vomiting took place between the fifth and eighth hour, but no BHC could be detected visually in the vomit. The convulsions, which were opisthotonic in character, occurred five to 12 hours after dosing. They were infrequent, three being the most observed in any one dog, and lasted one to two minutes, and were sometimes preceded by hysterical yelping. Other features of the toxic reaction were increased micturition, inco-ordination and blindness.

During the depression stage the dog kept to its bed, and if disturbed stood with its tail between its legs, head down and appeared dejected. Food was refused until the third or fourth day, but thirst was increased.

(*c*) Post-mortem *Findings.*—Four dogs were destroyed, five to seven days after the administration of the BHC. Two of these dogs had received 1 gramme BHC per kg., and two 0·25 grammes per kg. All dogs had apparently recovered from the effects of the toxicant before they were sacrificed.

Stomach: Haemorrhagic petechiae especially of the pyloric region.

Intestines: Discrete areas of congestion.

Kidneys: Congested.

V. Skin Application in the Dog

(*a*) A circular patch 6 to 8 cms. in diameter was shaved and partially scarified on either side of the dog behind the shoulders, extending over the lower portion of the ribs. Fifteen grammes of 5 per cent. BHC dressing in a base of soap and china clay was applied as a paste to the shaved

area on one side of the four dogs. The opposite side was treated with an identical preparation, except that DDT or Derris were substituted for BHC in two dogs. The third dog received the soap and china clay alone, while the fourth dog had one side left untreated.

(b) Results.—No systemic reaction was observed in any dog. In two dogs treated with the BHC paste there was evidence of an initial irritation, associated with excessive scab formation. This lesion, however, rapidly resolved and a week later no difference could be detected between the BHC and other type dressings.

VI. Microscopic Examination

A histological examination was carried out on material taken from the intestine and kidney of two dogs, from the liver and kidney of four sheep, and from the brain of three sheep. The material from the dogs was fixed immediately after death. The intestines showed capillary congestion, but no advanced inflammatory changes. The kidneys showed congestion, with glomerular and tubular inflammation, and in one dog there was an indication of an increased glomerular permeability to protein. The livers of the sheep showed marked venous congestion. The brain sections were suggestive of cerebral oedema. As the material from the sheep was not fixed until 12 to 15 hours after death, the cytology of the tissues was somewhat obscured by *post-mortem* changes.

VII. Discussion

The indications of this limited trial are that BHC allows a good margin of safety when used against animal ectoparasites. The dosage rate at which a definite toxic, but not lethal, response appeared in sheep was 0·25 grammes per kg. Certain sheep scab dips have been approved by the Ministry of Agriculture for use at a dipping strength of approximately 0·125 per cent. BHC. At this concentration a 75 lb. sheep would need to ingest approximately 12 pints of the dip wash to acquire a dose of 0·25 grammes per kg.

The immersion of 250 sheep in a 2 per cent. BHC wash was without incident, and the application of 5 per cent. BHC spray suggests that skin absorption of the insecticide is not a significant hazard.

In the case of the dog a dosage rate as high as 1 gramme per kg. failed to cause death in the two dogs to which it was administered, while in sheep a dosage rate of 0·5 grammes per kg. was lethal. However, this apparent greater tolerance to BHC in the dog may have been influenced by the fact that the BHC was administered alone in capsule form, as opposed to being suspended in water.

Toxic symptoms appeared following 0·32 grammes per kg., which was the lowest dosage administered to any dog during this investigation. It is possible that a lower dosage rate may also induce symptoms, although the doubtful reaction in one out of the two dogs which received 0·3 grammes per kg. of toxicant infers the minimal dose is near to this figure.

As a result of work conducted at these laboratories we have found that an effective BHC concentration for the treatment of sarcoptic mange is 0.125 per cent., at which strength any danger of a toxic reaction occurring is remote. A small scale trial with 15 grammes of a 5 per cent. BHC paste applied to a scarified area provoked no toxic symptoms, although a transient irritation of the skin was observed.

The signs of gastro-intestinal irritation found on *post-mortem* examination were an unexpected development, as clinically no symptoms were observed to indicate this lesion, apart from the vomiting in the dog. The faeces in all animals were of normal consistency.

Microscopic examination indicated that the intestinal inflammation was in the nature of congestion, and tissue damage was not apparent.

It is of interest to note that the liver showed no macroscopic abnormality, except in one case, when there was slight congestion.

The degenerative changes in the kidneys and the oedema of the brain are consistent with polyuria and nervous symptoms which characterised a BHC toxic response.

Finally, it should be noted that in these experiments, the BHC was administered or applied as an undiluted finely divided powder, or as a suspension in water. It is possible that the use of BHC in a solvent would affect its rate of absorption, and thereby alter its degree of toxicity.

Acknowledgments.—The authors wish to record their thanks to Mr. E. Cotchin, Royal Veterinary College, for his examination and report on the various sections. They also thank members of the Cooper Technical Bureau for their assistance in the completion of the work and Messrs. Cooper, McDougall and Robertson, Ltd., for their permission to publish this paper.

Summary

A wettable powder containing 50 per cent. BHC, suspended in water, was administered by stomach tube to 12 sheep, at dosage levels of 0·05 to 3·0 grammes per kg. bodyweight. Definite toxic symptoms were first observed at a dose of 0·25 grammes per kg., and sheep receiving 0·5 grammes per kg. and over died. Toxic symptoms were characterised by intermittent opisthotonic convulsions, inco-ordination, polyuria and blindness lasting for up to 30 hours, followed by a period of marked depression for three to four days. Trials to assess the hazards of skin absorption involved the dipping of 250 sheep in 2 per cent. BHC dip wash, and the application of a 5 per cent. BHC spray. No toxic symptoms were observed.

Six dogs received BHC alone in capsule form, in doses from 0·3 to 1 gramme per kg. A toxic reaction occurred in one out of two dogs receiving 0.3 grammes per kg., and in every case where a larger dose was administered, but all dogs recovered.

Tests for skin absorption in four dogs using 15 grammes of 5 per cent. BHC paste applied to a scarified area over the ribs resulted in a transient irritation of the skin, but no systemic reaction occurred.

Post-mortem examination of six sheep and four dogs revealed patches of congestion in the stomach and intestines, congestion of the kidneys, and in sheep, petechial haemorrhages in the heart and oedema of the brain.

It is concluded that in view of the low concentration of BHC required to control ectoparasites, the chances of a toxic reaction occurring in practice are remote.

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CARBON TETRACHLORIDE DOSAGE IN SHEEP

Some Observations on Possible Chronic Toxicity

BY

J. E. N. SLOAN

Introduction

It is now nearly 25 years since the experiments of Montgomerie[1] in Wales established the value of carbon tetrachloride ($C.Cl_4$) for the control of fascioliasis in sheep. The worth of the new treatment was quickly appreciated and, before long, it became the practice of farmers in flukey areas to dose their flocks regularly in the autumn.

The usual routine was two or three doses of 1 c.c. of $C.Cl_4$ at monthly intervals, covering the months of September, October and November, and, in general, good control of fluke was obtained. But it has become apparent, through the years, that in bad fluke seasons, particularly, of course, after a succession of wet months, three doses may be insufficient to ensure complete control.

Carbon tetrachloride, in common with other drugs used in the treatment of fascioliasis, acts only on the adult or near-adult stages of the fluke. A period of ten weeks or more is required for the growth of the parasite to full maturity in the bile-ducts of the host, and probably it does not become vulnerable to the action of the drug until about the seventh week of development.

The peak output of cercariae from infested snails comes in the late summer and early autumn, and while a dose in late November will deal with infestations contracted prior to early October, flukes developing from cercariae ingested later will not have reached a vulnerable stage by the November dosing date. Moreover, in a bad year it may be necessary to advance the first dose from September to August, since adult flukes may be present in some numbers in lambs as early as mid-August (Personal observation).

It is clear, then, that when the season requires it, monthly dosing may be necessary from August to January and the question of possible chronic toxicity, due to the greater number of doses, arises.

The toxic hazards of $C.Cl_4$ treatment are well enough known both from the standpoints of over-dosage and of the effects of diet, although occasional unexplained flock idiosyncrasy still occurs. However, the literature contains relatively very little information on the effects of small doses repeated at monthly intervals. In view of the fact that normally the drug is excreted fairly rapidly and that any liver damage is quickly repaired, the risk of chronic intoxication seemed unlikely, but it was felt that more detailed information would be of value and accordingly the present trials were undertaken.

Experimental Methods

Throughout the experiment a drench containing 1 c.c. $C.Cl_4$ to 4 c.c. mineral oil was used.

In October 1948 twelve normal, healthy Southdown-Kent lambs, aged about eight months, were divided at random into four groups, each of three animals. One group was left untreated and the remaining three groups were dosed each month at the rate of 1 c.c. of $C.Cl_4$ per head (5 c.c. of drench), the standard dose for the control of fluke. At the end of three months one group, together with one lamb from the untreated group, was killed for examination, and similar action was taken after six months and again after nine months. All the lambs remained at pasture throughout the experiment.

In addition, since $C.Cl_4$ is also used for the control of nematodes, but at a higher dose rate depending on the age of the sheep, six extra lambs were treated in the same way as the original 12, except that they received an increased dose of 10 c.c. or 15 c.c. of drench, containing 2 or 3 c.c. $C.Cl_4$.

The dosing schedule may be summarised as follows:—

Dosing Schedule

Doses at Intervals of Four Weeks

Dose Rates in c.c. of $C.Cl_4$

Lamb No.	*Dose No.* 1	2	3	4	5	6	7	8	9		*Total $C.Cl_4$ per animal in c.c.*
4											
14	1	1	1	Killed for examination						...	3
18											
5	2	2	2		„			„		...	6
13											
6	Undosed				„			„			
3											
10	1	1	1	1	1	1	Killed for examination				6
17											
9	2	2	2	2	3	3		„		„	14
15											
11	Undosed							„		„	
2											
7	1	1	1	1	1	1	1	1	1	Killed for examination	9
16											
1	2	2	2	2	3	3	3	3	3	„	23
12											
8	Undosed							„		„	

Throughout the duration of the experiment dosing was uneventful and no signs of toxicity were seen at any time. As each group was slaughtered the Veterinary Pathology Section of the Cooper Technical Bureau made a comprehensive examination of the carcases, particular attention being paid to the liver.

In a comment on the results Mr. Harbour states: "From our examination there does not appear to be any indication of cirrhosis of the liver or any other general pathological process which could be attributed to the treatment. In several cases, multiple small abscesses or necrotic foci were present in the liver, but these were found both in dosed animals and in undosed controls. They were probably due to minor bacterial infections which were being dealt with by the animal in the usual way. Two sheep showed evidence of disease, namely No. 4, which had a very large abscess in the right kidney, and No 8 a control, which showed some enteritis in the small intestine, with healed ulcers in the abomasum. Histological examination of the liver in the latter case showed no abnormality."

On the evidence of the present series of examinations it seems reasonable to assume that monthly treatment of sheep with $C.Cl_4$ for periods of up to nine months and at dose rates of 1 to 3 c.c. of the drug is unlikely to cause a chronic intoxication and may be recommended with reasonable safety when deemed necessary.

It may be objected that the lambs used in the experiment were not fluke infested and that, had their livers been damaged by infestation, a different result might have been obtained. Montgomerie's original work, however, was done with sheep affected with fascioliasis and included cases varying from mild infestation to advanced liver rot, and the latter proved no more susceptible to intoxication than the former.

In the course of the experiment subsidiary observations were made on the effects of the dosing on the nematode worm burden of the lambs. Both faecal egg-counts and

post-mortem worm counts were undertaken. The dominant species of worms present were *Cooperia curticei* and *Bunostomum trigonocephalum*, with a fair number of *Strongyloides papillosus*. The last-named appeared unaffected by the dosing, but at the 2 and 3 c.c. levels a good response was obtained against *C. curticei*. Carbon tetrachloride has long been known as very effective against hookworms, and in this instance against the sheep hookworm, *B. trigonocephalum*, its value was fully confirmed, even the lowest dose of 1 c.c. producing a notable reduction as compared with the infestation present in the controls. An interesting observation made during the worm-counts appears to indicate that the drug is more active against the female hookworm than against the male.

In the untreated group the sex-ratio of females to males was 1 to 0.9 ; in the 1 c.c. dose group it was 1 to 1.5 ; and in the 2 to 3 c.c. group it was 1 to 9.

Conclusions

1. Small therapeutic doses of $C.Cl_4$ repeated at monthly intervals for periods up to nine months are not likely to cause chronic liver damage in sheep.

2. Doses of $C.Cl_4$, at the rates employed, are of definite value against nematodes, particularly the sheep hookworm, *Bunostomum trigonocephalum*.

Summary

1. An account is given of an experiment designed to show whether therapeutic doses of $C.Cl_4$, administered at monthly intervals to sheep for periods of up to nine months, would prove toxic. No toxic effects were noted.

2. Some incidental observations on the effect of the dosing on nematodes are reported.

Acknowledgments.—The writer is indebted to Mr. H. E. Harbour, B.A., M.R.C.V.S., and his staff for undertaking the liver examinations; and to Messrs. Cooper, McDougall & Robertson, Ltd., for permission to publish the experimental results.

Reference

[1]Montgomerie, R. F. (1926.) *J. comp. Path.* **39**. 2.

W.H.O. EXPERT COMMITTEE ON RABIES

Preliminary Note

An Expert Committee on Rabies of the World Health Organisation of the United Nations held its first session in Geneva from April 17th to 22nd, 1950.

The following members were present:—Dr. Ian A. Galloway, Director, Research Institute, Pirbright, Surrey, England (Chairman); Dr. P. Lépine, Director, Virus Division, Paris, France (Vice-Chairman); Dr. H. Koprowski, Assistant Director, Dept. of Viral and Rickettsial Research, Lederle Laboratories, Pearl River, New York, U.S.A. (Rapporteur); Dr. H. N. Johnson, Laboratories of the International Health Division, Rockefeller Foundation, New York, U.S.A.; Dr. K. Habel, Director, Laboratory of Infectious Diseases, National Institute of Health, Bethesda 14, Maryland, U.S.A.; Dr. M. L. Ahuja, Director, Central Research Institute, Kasauli, East Punjab.

Co-opted member: Dr. M. Baltazard, Director, Pasteur Institute, Teheran.

Secretaries: Dr. C. Klimt, Medical Officer, World Health Organisation, and Dr. M. M. Kaplan, Veterinary Officer, World Health Organisation.

The results of the deliberations of the Committee have been submitted as a report and on authorisation from the World Health Assembly or the Executive Board of the World Health Organisation will be published in their Technical Report Series.

A COMPARISON OF THE EFFICACY OF SULPHAMEZATHINE (SULPHADIMETHYLPYRIMIDINE) AND SULPHAQUINOXALINE IN THE CONTROL OF EXPERIMENTALLY INDUCED CAECAL COCCIDIOSIS IN CHICKS

BY

S. B. KENDALL,

Veterinary Laboratory, Ministry of Agriculture, Weybridge

As reviewed by Dickinson (1949) and Hawkins (1950), recent years have seen a marked increase in the use of drug therapy for coccidiosis in poultry.

After the establishment, by Horton-Smith and Taylor (1942 and 1943), of the use of sodium sulphamezathine for the control of caecal coccidiosis caused by *Eimeria tenella*, many other drugs were tested for their coccidiostatic effect. Among the most promising was sulphaquinoxaline which was reported by Delaplane *et al.* (1947) to have considerable activity in concentrations as low as 0·05 per cent. of the dry mash, while at a concentration of 0·10 per cent. the drug was shown to give complete protection even when administration did not commence until 48 hours after experimental inoculation with the oocysts of *Eimeria tenella*. Observations on sulphaquinoxaline were continued by numerous workers among whom may be mentioned Grumbles *et al.* (1948 and 1949), Jungherr and Winn (1949), and Grumbles and Delaplane (1948). Of these, Grumbles and Delaplane (1948), when comparing the relative effects of sulphamezathine and sulphaquinoxaline, were able to show that the latter was three to four times as effective as sulphamezathine if medication was started 72 hours after inoculation. Their work suggested that under field conditions only about one-quarter as much sulphaquinoxaline as the estimated dose of sulphamezathine would be required for prophylaxis or control and the use of sulphaquinoxaline among commercial poultry-men in America increased rapidly.

The drug is not yet in production in Britain but in view of the experimental evidence obtained by numerous workers, mainly in America, it was decided to carry out observations on the use of the drug and more particularly to compare its coccidiostatic effect with that shown by sulphamezathine.

Materials and Methods used in the Observations

Drugs.—When sulphamezathine, which is a brand of sulphadimethylpyrimidine prepared by Imperial Chemical (Pharmaceuticals), Ltd., was required in solution, 16 grammes of the drug were dissolved in 100 ml. of 2·4 per cent. sodium hydroxide solution. This formed a stable solution of the sodium salt which was diluted shortly before use with ordinary tap water. Sulphaquinoxaline in powder form was obtained as the commercial product sold in America. A stock alkaline solution containing the sodium salt was prepared by the method used for preparing sodium sulphamezathine, equal weights of the powdered drugs being assumed to give the same concentrations in similar alkaline solutions.

Chicks used in the Observations.—The chicks used in the observations were unsexed R.I.R. and R.I.R. crosses, most having been hatched at Weybridge. All day-old chicks were placed in isolation until required for experimental purposes at seven to ten days after hatching.

Oocysts used for Infection.—These were from cultures prepared at the Laboratory using faeces collected on the seventh to ninth days from chicks infected with a stock culture of *E. tenella*. Other cultures were prepared from the caecal

scrapings and caecal cores of experimentally infected chicks which had shown typical clinical symptoms of caecal coccidiosis. Infective material from these various sources produced consistent clinical symptoms in susceptible chicks and a consistently high death rate.

Experimental Procedure.—Chicks were isolated until the day of inoculation and throughout the experimental period were maintained in electrically-heated wire-floored brooders Each experimental chick received 1 ml. of a suspension of the oocysts of *E. tenella* placed directly in the crop by means of a glass pipette. The number of oocysts to be given was assessed by previous mortality tests and was calculated to produce 80 to 100 per cent. mortality in the untreated controls. Mortality was recorded only up to the eighth day after infection for, contrary to the findings of Wehr and Farr (1947), we saw no evidence of delayed mortality in those chicks receiving drugs. All chicks had access to unlimited supplies of dry mash and ordinary tap water, drugs being mixed with the food or water as indicated (Table I).

Results

The drugs were compared at concentrations ranging from 0·025 (in water) to 0·25 per cent. (in the food), the period of administration being usually from the 48th to the 120th hour after infection. Administration as late as the 72nd hour could be effective but was liable to introduce inconsistencies in results from groups receiving the same treatment. At a concentration of 0·025 per cent. in water, given from the 72nd to 96th hour after infection, both drugs proved ineffective. At concentrations of 0·1 to 0·25 per cent. in the food both sulphamezathine and sulphaquinoxaline, administered from the 48th hour, gave significant protection against acute coccidiosis, causing 90 to 94 per cent. mortality in untreated control chicks.

It seemed that a concentration of 0·05 per cent. of the drug in water was likely to be the lowest to give protection against the acute disease induced under our experimental conditions. Table I assesses the effects of sulphamezathine and sulphaquinoxaline by comparing mortality in groups receiving 0·05 per cent. drug in food or as a substitute for ordinary drinking water, with the mortality occurring in groups of untreated birds. The mortality in each group is indicated as a percentage of the original number which was never less than 29 chicks.

Observations A and B (Table I) refer to the administration of drug in the dry mash and it will be seen that both drugs gave some protection but that sulphaquinoxaline was approximately twice as effective as sulphamezathine.

Observations C, D and E refer to the administration of 0·05 per cent. drug in alkaline solution as a substitute for the drinking water from the 48th to the 120th hour. The use of different groups of chicks and different cultures of *Eimeria tenella* in these observations did not affect the uniformity of results obtained and gave a clear indication of the greater efficacy of sulphaquinoxaline.

Discussion

Our observations were limited to a comparison of the two drugs when used in low concentration against experimentally induced outbreaks of disease which were always acute in character. Under these conditions sulphaquinoxaline proved markedly superior, although there was little difference between the two drugs when used at higher concentrations. Most recent work on sulphaquinoxaline, *e.g.*, Jungherr and Winn (1949), has suggested use of the drug in extremely low concentrations but over extended periods. Particularly in such a capacity sulphaquinoxaline seems likely to prove valuable in the control of coccidiosis in Britain but any question of its substitution for sulphamezathine awaits more detailed investigation of its long-term effect. Up to the present, published information suggests that sulphaquinoxaline does not affect the development of immunity to *E. tenella*, while its toxicity to chicks is no greater than that of sulphamezathine used under comparable conditions.

Table I

Comparing Mortality from Caecal Coccidiosis in Chicks receiving 0·05 per cent. Sulphamezathine or 0·05 per cent. Sulphaquinoxaline following Infection with *Eimeria tenella*

Observation	Period of administration	Per cent. mortality in groups of 29 to 70 chicks		
		Receiving sulphamezathine	Receiving sulphaquinoxaline	Receiving no drug
A	(In food) 72nd to 144th hour after infection	46	22	78
B	(In food) 48th to 120th hour	65	37	94
C	(In water) 48th to 120th hour	47	14	99
D	(In water) 48th to 120th hour	46	6	100
E	(In water) 48th to 120th hour	59	5	87

Summary

Sulphaquinoxaline at a calculated concentration of 0·05 per cent. in the drinking water proved markedly more effective than sulphamezathine in limiting mortality from experimentally induced caecal coccidiosis in young chicks.

Acknowledgments.—This investigation was undertaken at the Veterinary Laboratory of the Ministry of Agriculture, Weybridge, under the supervision of Dr. E. L. Taylor.

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The Society of Practising Veterinary Surgeons

The Division of the National Veterinary Medical Association hitherto designated "The Society of Veterinary Practitioners" has changed its name to "The Society of Practising Veterinary Surgeons." Mr. E. J. Heather, M.R.C.V.S., D.V.S.M., who is to continue as Hon. Secretary *pro tem.*, will be succeeded by Mr. M. R. MacFarlane, M.R.C.V.S., of Spalding, when the latter has completed a change to new premises.

* * * * *

Weekly Wisdom

The universities are far more important than ever before, because in an equalitarian society the universities alone can maintain the standard of quality as distinct from quantity and of scholarly knowledge as distinct from public opinion. Without these things no civilisation can be of any very high value.—**Dr. G. M. Trevelyan,** O.M., Master of Trinity College, Cambridge, addressing Congregation on his installation as Chancellor of Durham University.

CLINICAL COMMUNICATION

NOTES ON DEATHS IN YOUNG PIGLETS SIMILAR TO THE HAEMOLYTIC DISEASE IN YOUNG FOALS

G. F. KERSHAW,

Veterinary Investigation Centre, Wye, Kent

Last year two cases were brought to our notice in which there had been 100 per cent. mortality amongst the piglets within 48 hours after birth although these animals appeared perfectly healthy at birth.

A bacteriological examination of the piglets gave negative results and the *post-mortem* examination, although suspicious of anaemia, was by no means conclusive. This year eight similar cases have been brought to our notice. The salient points are tabulated as follows.

1. The sows in all cases were in good condition and showed no ill effects after parturition.

2. All piglets were apparently healthy at birth. The piglets, once ill, did not linger very long, and in four of the cases all the piglets were found dead the next morning after appearing normal the night before.

3. In the first two cases the husbandry was bad, *e.g.*, cold, draughty farrowing pens, etc. There was also a strong possibility of "piglet anaemia" as the Hb estimation from other litters was in the region of 60 per cent. These factors, however, were contradicted by similar deaths taking place in herds where the husbandry was good and there was no suspicion of piglet anaemia.

4. Deaths took place after suckling and generally within 36 hours after birth.

5. A *post-mortem* examination of piglets from each litter showed no outstanding feature. Milk was present in varying quantities in the stomach and small intestine of all the piglets which were examined: the heart and kidneys were pale and the liver had pale patches interspersed with normal tissue.

6. The possibility of a virus infection was considered but appeared unlikely in view of the general facts of each case.

7. In one outbreak it appeared that a lethal factor might be incriminated but after a full investigation of the breeding history this theory was discarded.

It is suggested that a possibly similar condition is that described by Parry, Crowhurst and Day in their recent paper on "Diseases of New-born Foals: I.—Haemolytic Disease Due to Iso-immunisation of Pregnancy."[1] Here they found that the foals appeared healthy until they had suckled their dams. This observation was a constant finding with respect to the deaths of the piglets. Bruner *et al.*[2] have been able to produce this condition by immunising a gilt against the erythrocytes of a test boar whose blood was incompatible with the blood of the dam. The authors state that their findings are based on laboratory work whereas the observations in this communication at the time of writing have not been supported by serological investigation.

Our *post-mortem* findings are similar to those of Bruner *et al.* in that anaemia was evident in the young piglets rather than the jaundiced condition found in foals.

Whilst investigating the breeding history of a batch of four Essex sows that had farrowed down with complete loss of their litters, the fact emerged that this condition has been observed by other veterinary surgeons in Essex.

It is hoped that blood investigations will be carried out in the near future on the boars and sows in question to confirm the above findings.

ABSTRACTS

[A Study on Canine Encephalitis. Koprowski, H., Jervis, G. A., James, T. R., Burkhart, R. L., & Poppensiek, G. C. (1950.) *Amer. J. Hyg.* **51.** 63.]

The study was initiated by observations on 22 dogs obtained from three epidemic foci in one of which 60 out of 70 dogs died in the same kennel (with scattered cases the total was 163); all of the 60 had received distemper antiserum some four months previously, while the adult dogs in this kennel had been vaccinated. The age of the animals was mostly under one year. The duration of the illness varied with the neurological signs, from one to 16 days. The symptoms were fever, anorexia, depression, loss of weight, discharge from eyes and nose, and mild diarrhoea which preceded motor impairment, myoclonic movements of limbs and jaws, and convulsions. The main pathological lesions in the nervous system consisted of irregular foci of demyelination (of varying severity), in all cases but one involving the cerebellum and adjacent regions; there was relative preservation of axis cylinders and demyelination was thus the earliest selective damage; proliferation of atypical neuroglia with giant multinucleated forms was characteristic but perivascular infiltration was conspicuous only in three cases; thickening of vessel walls and swelling of endothelium (mainly of vessels in the cerebrum) was present, and intranuclear inclusions in the cells of the walls were seen also. Occasionally the lesions were necrotising in character.

Pooled tissues from four separate dogs were inoculated into groups of ferrets, all of which went down with typical distemper-like illness in from eight to 23 days. After three passages through ferrets material was inoculated into four puppies (seven weeks old and bred on the premises); two were inoculated intracerebrally and two intraperitoneally. Without clinical evidence of distemper and without fever (the temperature going to subnormal levels), all were dead within six days. After the prodromal symptoms had set in there was acute fulminant illness with convulsions and paralysis in those puppies injected intracerebrally. Ferrets injected with tissues from these experimental animals also went down with distemper. Cross-immunisation rather than cross-neutralisation tests were done; two non-immune ferrets went down on the 13th day with distemper while two immune animals were asymptomatic within a 60-day observation period. One of the experimental puppies inoculated intracerebrally showed lesions of the same nature as those described; the other in this group showed meningitis; the two injected intraperitoneally showed no lesions in the nervous system. There were no lesions in the nervous system of any ferret.

The results are discussed at length in the light of old and current ideas on the existence of viral conditions in dogs (U.S.A. and Britain) besides distemper, with particular reference to hard-pad disease. The authors see no escape from the conclusion that they were dealing with the distemper virus which had been responsible for this demyelinating encephalitis. This is in accordance with the work of Weston Hurst in Australia, but contrary to the ideas of McIntyre *et al.*

[The concepts engendered by the work of Rubarth (1947) and McIntyre, Trevan and Montgomerie (1948) on the

References

[1] Parry, H. B., Day, F. T., & Crowhurst, R. C. (1949.) *Vet. Rec.* **61.** 435-440.

[2] Bruner, D. E., Brown, R. G., Hull, F. E., & Kincad, Alice S. (1949.) *J. Amer. vet. med. Assn.* **115.** 94-96.

problems of viral infections (particularly encephalitis) of dogs denote this to be a very important paper. Most, if not all, subsequent contributions to discussions on this subject in Britain have been clinical in nature and we know the limitations imposed on observers in this direction. Whatever criticisms might be made of the author's interpretations there can be no gainsaying the value of such studies of natural and experimental canine disease. It is additional evidence of the complexity of this particular sphere of canine pathology. The article should be read in the original by all who are interested.—*Abstractor.*]

J. R. M. I.

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[The Pathogenicity for Mice of Group B Streptococci of Bovine Origin. PATTISON, I. H. (1949.) *J. Hyg.* **47.** 159.]

Pattison has investigated the pathogenicity of *Str. agalactiae* for mice. His work suggests that although this organism is of low virulence for the mouse, it is not as low as has been generally considered by other workers.

It was possible to kill mice with strains of *Str. agalactiae*, there being a definite relationship between lethal power and the number of living organisms inoculated. Equal doses of the same strain killed more mice when inoculated intravenously than when inoculated intraperitoneally. There was some suggestion in these experiments that virulence was related to serological type, the majority of the more virulent strains being related to Stableforth's sub type Ib. One particular strain, S.13, gave rise to a rapid, fatal bacteraemia by either the intraperitoneal or intravenous routes. Following intravenous injection, dense clumps of streptococci could be demonstrated histologically in a variety of organs.

D. L. H.

REVIEW

[Lehrbuch der Tiergeburtshilfe. (Edited by J. RICHTER & R. GOTZE.) Published by R. Schoetz (Berlin). Pp. 671, with 465 illustrations.]

There is at present a number of remarkable veterinary textbooks appearing in both France and Germany. They embody in their various spheres not only the foundations of their subjects, but the major developments which have taken place in the last decade. One must regretfully admit that there is nothing comparable in English, as so many of our best minds are too fully occupied in the day-to-day pursuit of knowledge to be able to devote time to preparation of any comprehensive review of their subjects in their entirety. One hopes, however, that some such works may be in process of gestation.

A notable example of German contribution to modern veterinary science is the "Lehrbuch der Tiergeburtshilfe," edited by J. Richter and R. Gotze. Among contributors are such well-known names as Benesch and Lagerlöf. Dealing first of all with the history of veterinary obstetrics (surprisingly interesting), it proceeds to a consideration of normal pregnancy, followed by the pathology of that condition. The same pattern is followed in considering the phenomena of birth; this leads naturally to the subject of obstetrics proper, which is introduced by descriptions and illustrations of instruments used. While the present reviewer for long despised embryotomy, he now realises that this is possibly because he is blessed with a small hand and a long arm; nevertheless, there does seem considerably greater importance attached to embryotomy abroad than in this country, and the various implements and procedures are here fully set out, as also is the technique of caesarean section in all domestic animals, and for treatment of torsion of the uterus. Particularly noteworthy is the clarity with which the indications for various procedures and techniques is set out. Monstrosities are relegated to their true place of comparatively little importance; but malpresentations, in so far as it is possible to classify them, are clearly indicated and their correction described. Finally, various untoward sequelae of parturition, *e.g.*, eversion, retained placenta, toxaemia and septicaemia are dealt with (although no mention is made of antihistaminics in the treatment of the latter conditions), finishing up with a most enlightening survey of mineral deficiency diseases and ketoses, and of diseases of the new-born.

In short, a *most* worthwhile contribution, one which could materially lighten the labours and improve the results of teacher, student and busy obstetrician.

PURCHASE TAX

In Committee on the Finance Bill on June 20th, a motion by Mr. Lyttelton (C., Aldershot) to add a new clause to the Bill, by which the first, second and third rates of Purchase Tax would be reduced from one-third, two-thirds and 100 per cent. of the wholesale value of goods to one-quarter, one-half and four-fifths, was defeated by 288 to 280.

Mr. Lyttelton said that Purchase Tax had originated as a check to consumer buying and as an anti-inflationary measure during war-time. The intended application of the tax at that time had now been widely departed from, as also from the general conception which brought it into being. This year, for the first time, it had been used as a tax upon capital goods and upon the tools of industry, because that was what commercial vehicles were. The tax had spread far away from those articles which were considered to be not indispensable and was now levied upon many absolute necessities, or, at best, upon goods which were semi-necessities. If proof were needed that the tax was spreading, it would be found by looking at the yield. In 1941 the yield was £97,000,000, and it had risen to £303,000,000 in 1950. It was thus a very important source of revenue, but it was an objectionable tax, at least in its present form, as a permanent part of the fiscal system.

Sir Stafford Cripps said that Purchase Tax, as it had been developed in the last few years, had now become a tax which was not broadly progressive but a tax which for the purpose of the present time was a suitable way of raising money.

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POST-GRADUATE EDUCATION OF THE MEDICAL G.P.

The report of the Committee set up by the British Medical Association under the Chairmanship of Sir Henry Cohen to continue the Association's study of medical education by considering the post-graduate education of the general practitioner has now been issued. There has been a tendency hitherto, says the report, to regard the post-graduate education of the general practitioner mainly as a matter of occasional "refresher" courses and lectures. In the view of the Committee this is far too narrow a conception, for it leaves unsatisfied some of the practitioner's greatest needs, and in practice the courses and lectures fail to attract more than a small proportion of those for whom they are intended. Professional education should be a continuous process extending throughout the practitioner's active life and forming part of the very fabric of practice.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

SWINE FEVER:

Angus.—Cuthie Farm, Arbroath, Angus (June 20th).

Renfrewshire.—Corseford Piggery, Howwood, Renfrewshire (June 20th).

ROYAL COLLEGE OF VETERINARY SURGEONS

Annual General Meeting in Dublin

The One Hundred and Seventh Annual General Meeting of the members of the Royal College of Veterinary Surgeons was held at the Royal College of Physicians in Dublin, Ireland, on Wednesday, June 7th, 1950.

Professor T. Dalling (President) was in the chair and there were also present: Captain J. R. Barker, Professors W. I. B. Beveridge, F. Blakemore, T. J. Bosworth, T. G. Browne, J. B. Buxton, Messrs. M. J. Byrne, J. J. Campbell, Dr. L. Collery, Mr. P. Collick, M.P., Professor F. A. E. Crew, Messrs. F. J. Daly, H. W. Dawes, H. Dolan, P. F. Dolan, Dr. J. T. Edwards, Professor J. W. Emslie, Mr. J. A. Flynn, Professor R. E. Glover, Messrs. G. N. Gould, J. W. Heney, E. A. Hirsch, R. E. Hodgins, H. Holroyd, P. J. Howard, R. Jennings, Professor W. Kearney, Messrs. B. J. G. Kelly, J. Kyne, J. J. K. Linton, T. J. Lynch, Dr. W. B. McAleer, Professor P. A. McGeady, Captains W. R. McKinna, T. M. Mitchell, Professor W. M. Mitchell, Dr. R. F. Montgomerie, Mr. P. E. Mullaney, Mrs. R. Mullaney, Mr. J. P. Nowlan, Professors J. J. O'Connor, A. F. O'Dea, Messrs. P. I. O'Donoghue, T. O'Scanaill, J. D. Peele, Captain J. W. Procter, Major L. P. Pugh, Messrs. J. N. Ritchie, P. A. Rogan, Professor J. Share-Jones, Messrs. H. W. Steele-Bodger, J. Henderson Stewart, M.P., Major H. Sumner, Messrs. R. V. Thatcher, W. L. Weipers, Professor G. H. Wooldridge, Dr. W. R. Wooldridge and Professor J. G. Wright.

Apologies for absence were received from Mr. L. Guy Anderson, Professors G. F. Boddie, R. C. Garry, Messrs. J. B. Hunter, G. P. Male and J. F. D. Tutt.

The Registrar read the notice convening the meeting as it appeared in the *London Gazette* for May 12th, 1950.

The minutes of the previous annual general meeting held on Wednesday, June 1st, 1949, were read and signed as correct.

Thanks to the Veterinary Council of Ireland

The President paid a warm tribute to the Veterinary Council of Ireland and to the profession in Ireland generally for the kind invitation whereby the annual general meeting was held in Dublin.

The President of the Veterinary Council of the Republic of Ireland responded and expressed the pleasure of the profession in Ireland that the meeting was held in Dublin. He recalled that it had been held in Dublin on two previous occasions, namely, in 1873 and 1912.

Appointed Members of Council

The Registrar reported that:—

(*a*) The Privy Council of the United Kingdom of Great Britain and Northern Ireland had appointed Mr. J. Henderson Stewart, M.P., in the place of Mr. McNair Snadden, M.P., resigned, for the period ending on May 31st, 1953;

(*b*) The University of London had appointed Professor J. B. Buxton as the second representative of that university for a period of four years, as the Royal Veterinary College and Hospital of London had become a school of the University of London;

(*c*) The University of Glasgow had appointed Mr. W. L. Weipers as the second representative of that university for the period ending at the Annual General Meeting in 1953, as the Glasgow Veterinary College had been incorporated into the University of Glasgow.

Elected Members of Council

(*a*) The Registrar read the following report of the auditors on the scrutiny of voting papers:—

We hereby certify that we have checked the voting papers sent in for the election of five members of the Council of the Royal College of Veterinary Surgeons, and that the number of votes obtained by the eleven members nominated for the vacancies are set out below against their respective names:—

1st	Ritchie, J. N. ...	1,010
2nd	Tutt, J. F. D. ...	758
3rd	Emslie, J. W. ...	734
4th	Holroyd, H. ...	652
5th	Peele, J. D. ...	634
6th	Matthews, H. T.	614
7th	Forsyth, A. A. ...	610
8th	McKinna, W. R.	557
	Spicer, A. ...	557
10th	Mitchell, P. J. ...	441
11th	Foden, C. A. ...	270

The total number of voting papers received was 1,534, of which 167 were returned by overseas members, and there were in addition 32 voting papers declared invalid.

(signed) Wilkinson, Chater & Co.

The Registrar announced that in accordance with the report by the auditors, Messrs. Ritchie, Tutt, Emslie, Holroyd and Peele, were elected for a period of four years.

(*b*) *Republic of Ireland.*—The Registrar read a report from the Registrar of the Veterinary Council of the Republic of Ireland stating that Mr. P. A. Rogan was elected as general elected member for a period of four years.

Annual Report and Statement of Accounts

The Annual Report and Statement of Accounts for the year ended March 31st, 1950, was submitted and it was unanimously resolved:—

That the said Annual Report and Statement of Accounts be received and adopted.

Honorary Fellowship of the Royal College of Veterinary Surgeons

The President, amidst applause, presented to Mr. Howard Winnington Dawes the diploma of Honorary Fellow of the Royal College of Veterinary Surgeons. He spoke of the difficult period of office as President which Mr. Dawes had carried so successfully during the years 1946–49; and also of the pleasure with which the profession had heard of the conferment of the C.B.E. upon him.

Mr. Dawes expressed his very warm thanks to all those present and to all those who were unable to be present.

John Henry Steel Memorial Medal in Gold

The Senior Vice-President (Mr. H. W. Dawes) presented the President (Professor T. Dalling) with the John Henry Steel Memorial Medal in gold. In so doing he recalled that the terms of the medal were "to perpetuate the memory of an earnest worker so that his example might incite others and benefit the profession by encouraging and rewarding merit." He also recalled that the medal was awarded by the Council as a reward for scientific or literary work of merit connected with the profession. Mr. Dawes, in paying tribute to the work which Professor Dalling had carried out, mentioned that not only was it well known in the British Isles but also in the entire world.

Professor Dalling, very shortly but very earnestly, thanked the Council and everybody present for this award which was one of the highest in the veterinary profession.

Votes of Thanks

A unanimous vote of thanks to the President for his conduct in the chair and for his services during the past year was carried with acclamation; as was also a unanimous vote of thanks to the Irish Veterinary Council and the profession in Ireland for their hospitality.

Professor J. Share-Jones

Before the termination of the meeting the President announced that Professor J. Share-Jones, M.B.E., M.D., D.V.Sc., M.Sc., F.R.C.V.S., had not sought re-election to Council and, therefore, ceased to be a member of Council after 38 years' service; he having been first elected in 1912 and had held the position of President in the year 1928–29.

Professor Share-Jones thanked all his colleagues.

NATIONAL VETERINARY BENEVOLENT AND MUTUAL DEFENCE SOCIETY

Annual General Meeting at Manchester

The annual general meeting of the National Veterinary Benevolent and Mutual Defence Society was held at the Midland Hotel, Manchester, on May 10th, 1950, with the President, Mr. John Holroyd, in the chair.

In reviewing the work of the past year, the Chairman reminded members of his previously-expressed desire to build up a Defence Fund reserve of at least £10,000. He repeated his warning of the possible extent of any one claim, but felt there was every reason to be satisfied with the increase of £2,600 in the capital of the Defence Fund to a total of over £7,000. It reflected great credit on the work of the Society's officers, and particularly Major F. Hopkin, whose work and enthusiasm were boundless. Increased grants had been made from the Benevolent Fund, which was in a sound and healthy condition.

Accounts

The accounts for the year were submitted by the Hon. Treasurer, Major F. Hopkin. The income of the Defence Fund amounted to £2,917 4s. 3d., while expenditure was exceptionally low at £295 6s. 11d. As a result, the capital of the Fund had been increased to £7,054 16s. 3d. As regards the Benevolent Fund, ordinary income amounted to £504 3s. 5d., to which, however, must be added £895 10s. 6d. from donations, including a legacy of £350 from the estate of the late George Elmes. Grants made during the year totalled £571 6s. 10d. and other expenditure amounted to £9 16s. 6d. The accounts were approved.

Hon. Secretary's Report

The Hon. Secretary's Report was submitted by Major F. Hopkin, and revealed that 24 Defence Fund cases had been dealt with during the year. A number of these related to matters outside the scope of the Defence Fund, and he felt it necessary to emphasise that the Defence Fund rules were framed to provide cover against claims arising out of veterinary practice only. Only one case had resulted in an admitted claim, which the Society had settled in the sum of £50. Two cases were successfully defended in the Courts and three other cases were dealt with by the Society's Solicitors and were not subsequently pressed. In 11 other cases, advice was given and no claims resulted, while the remaining cases were outside the scope of the Defence Fund. Other matters dealt with during the year included contracting-out in boarding cases, eligibility to membership of Registered Practitioners, and the establishment of professional contacts in Northern Ireland and Eire. As regards the Benevolent Fund, the legacy of £350 given to the Society by the late Mr. George Elmes was a very welcome addition and tribute was paid to this former member's splendid gesture. Thanks were also due to those who had made donations to the Fund. Benevolent Grants showed an increase at £571 6s. 10d. and assistance had been given in several new and deserving cases.

Appointment of Officers

The following officers were appointed: President—Mr. John Holroyd; Vice-Presidents—Mr. H. Sumner and Mr. A. H. Watson; Hon. Secretary and Hon Treasurer—Major F. Hopkin; Council—Mrs. E. H. Shaw and Messrs. J. Adamson, Junr., F. Beckett, C. W. Cartwright, H. W. Dawes, O. V. Gunning, H. Holroyd, D. E. Leask, R. C. Locke, W. R. McKinna, T. M. Mitchell, R. F. Ross, C. F. Shawcross, H. W. Steele-Bodger, W. K. Townson, A. J. Wright, H. M. Wilson and T. Wilson.

NOTES AND NEWS

Diary of Events

July 12th.—Meeting of the Editorial Executive Committee, N.V.M.A., 2.30 p.m.

July 12th and 13th.—Annual General Meeting of the Association of Veterinary Teachers and Research Workers (Northern Region), at Aberystwyth (Veterinary Department, Agricultural Building, Alexandra Road).

July 21st.—Meeting of the Association of Veterinary Teachers and Research Workers (Southern Region), at the Royal Veterinary College, Camden Town, N.W.1, 2 p.m.

July 21st.—Summer Meeting of the Royal Counties Division, N.V.M.A., at Whipsnade Park Zoo, 11.15 a.m.

Aug. 3rd.—Special Meeting of Technical Development Committee, N.V.M.A. to discuss report on Artificial Insemination, at 36, Gordon Square, London, W.C.1, 11 a.m.

Sep. 3rd-8th.—Sixty-eighth Annual Meeting and Congress of the National Veterinary Medical Association, at Cardiff.

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N.V.M.A. Council and Committee Meetings

The next Council and Committee meetings of the Association will be held in London on July 12th, 13th and 14th.

The time-table is as follows;—

Wednesday, July 12th, at 36, Gordon Square, W.C.1.
11 a.m. Organising Committee.
2.15 p.m. Veterinary State Medicine Committee.

Thursday, July 13th, at 36, Gordon Square, W.C.1.
10 a.m. Parliamentary and Public Relations Committee.
11.30 a.m. Home Appointments Committee.
2.30 p.m. General Purposes and Finance Committee.

Friday, July 14th, at Connaught Rooms, Great Queen St., W.C.2.
11 a.m. **Council Meeting.**

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PERSONAL

Appointment.—The Colonial Office announces the appointment in the Colonial Veterinary Service of Mr. R. H. Brown, M.R.C.V.S., as Veterinary Officer, Kenya.

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Marriage.—Loxam—Smith.—On June 7th, 1950, at Lancaster Priory and Parish Church, John G. Loxam, M.R.C.V.S., to Margaret L. Smith, S.R.N.

PRIORITY DELIVERY OF NEW CARS

In a statement issued last week, the Society of Motor Manufacturers and Traders observes that in order to avoid misunderstanding regarding deliveries of new cars, it should be made clear that two, and only two, priorities are recognised. The first is for orders sponsored by the British Medical Association on behalf of doctors and the second is for orders sponsored by the Ministry of Health on behalf of midwives.

Most of the 1,000,000 or more remaining orders outstanding for new cars are for other professional and business use. These orders, apart from ranking before those for non-essential purposes, receive no preferential treatment.

The statement adds that the quota of cars for the home market in 1950 amounts to only 110,000. "The working of the delivery system is entirely a matter for distributors and dealers, and is not one in which the Society can intervene in individual cases."

[As members of the Association will be aware, it has been—and remains—the constant endeavour of the N.V.M.A. to secure the inclusion amongst these priorities of orders sponsored by the Association. The utmost that it seems possible to achieve, however, is the present position whereby members of the profession rank high in the category of remaining "essential users," where the need of a new car is urgent. Accordingly it may be hoped that area distributors will act with due regard to the recognition of that status, reached by agreement (in default of any greater concession) between the N.V.M.A., the Ministry of Supply and the Society of Motor Manufacturers.—*Editor.*]

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ROYAL COLLEGE OF VETERINARY SURGEONS

Central Library for Animal Diseases

Accessions for the Quarter Ending May, 1950

Presentations

Books

Kaura, Ram Lall: Cattle development in the Uttar Pradesh (Allahabad), 1950. Presented by the author.

Vicard, A.: Les laparotomies chez les bovins, Paris, Vigot Freres, 1950. Presented by the N.V.M.A.

Reports, 12; *Pamphlets and Reprints*, 16.

Purchases

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GLASGOW VETERINARY SCHOOL ALUMNUS ASSOCIATION

A meeting of Glasgow Veterinary College Graduates was held during the 14th International Veterinary Congress in London and it was decided to proceed with the formation of an Alumnus Association.

Invitations to join the Association have been addressed to all Glasgow Graduates. The annual subscription includes a free copy of the issues of *The Veteran*, a specimen copy of which accompanied the invitation. If any graduate has not received an invitation, will he please inform the Hon. Secretary.

The annual general meeting will take the form of a lunch during the N.V.M.A. Congress in the Queen's Hotel, Cardiff, at 12.30 p.m., on Wednesday, September 6th, 1950.

To facilitate catering arrangements will all Glasgow Graduates who wish to attend please obtain tickets (price 10s. 6d.) from the Honorary Secretary, Mr. N. C. Aitken, Glasgow Veterinary School, 83, Buccleuch Street, Glasgow, C.3.

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SCHUMAN PLAN AND FARMING PRODUCTS

A motion to extend the proposed Schuman European coal and steel pool to include principal farming products has been tabled in the French Chamber of Deputies by M. Pierre Pflimlin, former Minister of Agriculture, and other members of the Popular Republican Party.

The authors of the motion consider some such organisation of agricultural markets necessary before the end of the Marshall Plan. They favour the creation first of a European Wheat Office to plan wheat production as a whole and guarantee sales. After that, dairy products, meats, fats, animal feeding-stuffs and sugar would be brought into the pool.—*Reuter.*

Owners of attested herds in Westmorland have complained of alleged laxity by some hauliers in complying with the Transport of Animals (Amendment) Order 1959. Such a practice, it is emphasised, might result in farms losing their attested status. It is asserted that after attested animals have been loaded the same lorry has picked up non-attested stock.—*Farmer and Stockbreeder.*

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

"AN OLD DISEASE IN A NEW ROLE"

Sir,—The communication from Mr. Sellers to the *Record* of March 11th dealing with the puzzling occurrence of "swayback" in a flock of folded sheep and similar symptoms in store bullocks, is of unusual interest, for if taken in conjunction with several others which have appeared from British practitioners for many years past describing unprecedented conditions of nervous origin occurring in livestock and attributed to various hypothetical causes, it suggests the presence in Britain of a deviation from disease conditions ordinarily encountered. I have no doubt that this unorthodox affection is similar to that which made its appearance here first in pigs and soon afterwards in all other domesticated and farm animals, including poultry, about the time poliomyelitis became rife some 15 years ago, and still persists. Indeed, it may be associated, in an obscure way, with that dread disease as it is evidently due to a virus, while its clinical manifestations show in general similar abortive, transient and residual paralytic phases, the occurrence of which cannot be explained by any ordinary causal factor. Theiler's exposition of a histological picture taken from the cord of his paraplegic mouse which corresponded to that seen in infantile paralysis is of interest in this connection.

The clinical similarity is perhaps best marked in the case of the horse. From Press reports of the supposed lameness shown by an Oaks winner, when cantering to the gate, I am of the opinion that the condition was due to an abortive attack of paralysis which momentarily caused a functional locomotor disturbance. Such attacks are common enough. At all events lame horses do not win races. Doubtless that good hunter-chaser "Mr. Jinks," favourite for the "O'Reilly Cup" at Fairyhouse, was the victim of a more serious attack when on the way to the post and which later developed to such an extent as to necessitate destruction. I have encountered many similar cases during the past ten to 15 years. Again, from Press gleanings it would appear likely that a similar mysterious affection cast the great mare "Zodia" into oblivion. Space will not permit of more than a synopsis of the general clinical condition. To begin with a flaccid paralysis, partial or complete, which may be extensive or very circumscribed, is the cardinal symptom in all livestock. Occasionally spastic paralysis, incoordination or ataxy may be noted. Abortive attacks which may recur, appear and disappear instantaneously. Transient paralysis of the leg muscles is a prominent feature and is often mistaken for lameness. When both hind legs are affected a swaying movement is set up. This condition appears to be amenable to treatment leaving, like the abortive form, no ill effects whatever. Complete paralysis in one or all four legs is common, rendering the subject unable to rise, while the third phase—that of residual paralysis—as in the human, results in permanent disability. Any part of the C.N.S. may become involved with resultant muscular abnormalities. Further, with a background of paralysis other varied and almost incredible manifestations, due apparently to the vagaries of a deranged nervous control, may be encountered, *e.g.*, sudden deaths, particularly in pigs (respiratory centre); abnormal body temperature—too high for registration by the ordinary thermometer (heat centre). Cancer may be described as embryonic tissue gone mad. Here evidently we have nerve tissue gone awry. The oedema commonly met with in young paralysed pigs, and occasionally seen in other animals, may conceivably be due to one of the many vagaries in evidence, especially as the brain in such cases is generally the initial centre of disturbance. Fortunately the disease does not appear to be contagious.

The degree of immunity which this disease has enjoyed in its new role until recently, when it was singled out for investigation in the pig, indicts beyond measure the necessarily urbanised and detached civil service livestock management system. The establishment of the A.H.T. not only pillories its inefficiency but also marks the resurgence of the soil-rooted and experienced veterinarian whose present day capabilities in dealing with the animal in health as well as in disease can no longer be ignored by a progressive administration.

Yours faithfully,

Nenagh. T. Treacy.

June 7th, 1950.

DEHORNING OF CATTLE

Sir,—To those who are uncertain about dehorning the writer is of opinion that a copy of Professor J. G. Wright's book on Veterinary Anaesthesia is invaluable. The site for injection is the upper third o. the temporal ridge, 1 inch below the base of the horn. Insert the needle so that its point lies not more than ½ inch deep, immediately behind the ridge, and inject 5 c.c. of local anaesthetic solution. This was the site used and anaesthesia was perfect. We used the cast position with plenty of straw for the animals to rest on. Tie a rope loosely round the cow's neck, put a half hitch behind the front legs, another in front of the hind legs, and lead the animal out. Pull hard on the rope and the beast will sink to the ground. The saw used was an ordinary one, ten teeth to the inch. Haemorrhage, which was not serious, was controlled by means of a couple of sharp pokers, which were heated on a convenient primus stove. The writer believes that in most cases haemorrhage can be ignored.

Yours faithfully,

Nantypoptu, Maesllyn, Llandyssul, Cards. J. McIlwaine.

June 24th, 1950.

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ATTESTATION: IS IT A GOOD POLICY?

Sir,—The letter by John Francis on the above subject in your issue of May 13th is a masterly exposition of the expected economic, nutritional, and hygienic value of the attestation policy, but it does not answer the case of L. Pitcher, who first broached the question.

Mr. Pitcher's case, I think, is that the application of the attestation policy to Scotland, so far, has caused the human death rate from respiratory tuberculosis in that country to be much higher than it otherwise would have been, and to that extent it has been and still is a bad policy. He may be wrong, as Mr. Francis thinks and I agree, in imagining that what he calls "tuberculin" in milk from tuberculous cows, pasteurised or not, can protect human beings. It may be—again as Mr. Francis thinks and I agree—that any such protection of the human being from a fatal respiratory infection would more likely be the result of former slight lesions caused by the live bovine bacillus. But this is relatively a minor point and the major contention remains so far unshaken by any statement of fact.

It is not enough to say, as Mr. Francis does, that "so many factors influence epidemiological trends that the figures quoted (by L. Pitcher) cannot be accepted as evidence." To rely upon such a defence against Mr. Pitcher's case is to take the easy way out, a way moreover which may not be true.

Epidemiological factors powerful enough to make so great a difference between respiratory tuberculosis mortality in Scotland and England could not long remain hidden from a determined investigator, and I hoped that Mr. Francis would lead a demand for such a determined investigation which, if successful, would bring honour and renown to the veterinary profession. Apart from the fate of the afflicted, and the good name of Scotland, it is a problem of great scientific interest and not just a piece of crankiness that can be shouted down in a vociferous assertion of the veterinary value of the attestation policy.

It is pleasant to imagine, as Mr. Francis so cogently does, a future in which the medical profession shall have agreed upon and applied a form of immunisation against tuberculosis more certain and less dangerous than giving people leave to drink raw milk from tuberculous cows. When that happens the attestation policy may become an irreproachable policy. But Mr. Pitcher dealt with recent years and with what is happening now, and so must we.

If it is true that milk from tuberculous cows can to some extent protect a human community against a fatal respiratory infection at the cost of a smaller number of people less dangerously infected with non-pulmonary bovine tuberculosis, then, until there is a safer means, and until it is generally applied, the attestation policy must be partly a bad policy because it is killing more people than it keeps alive. That is how I think Mr. Pitcher sees it, and that is how I see it, pending the demonstration of epidemiological factors other than the bovine bacillus in cows' milk to account for the difference in question.

In conclusion, please let me commend *The Veterinary Record* for allowing the frank expression of views on such an unpopular question and so paving the way for the necessary investigation.

Yours faithfully,

Briseis House, Derby. Tasmania. J. W. Rainey.

Sir,—In the June 17th issue of *The Veterinary Record*, Mr. J. F. D. Tutt makes a most alarming statement in that "There is a considerable body of opinion in our profession and in the medical profession which contends that the reduction of the incidence of bovine tuberculosis has been followed by an increase of the disease in man." If this is the case, why have we been allowed to carry out herd clearance of the infection when the knowledge exists that by so doing we are increasing the risk of human beings contracting the disease? Mr. Tutt further states that "The Accredited Herd is a menace, as for the most part it is a sanctuary for cattle that fail to pass the tuberculin test." This remark is not compatible with Mr. Tutt's earlier statement.

Although for years I have suspected we were reducing human resistance, it was not until last November when the Scottish and English figures were sent to me, which showed Scottish notifications rising sharply and English falling gradually, that I had evidence to publish what I believe to be true.

In answer to the letter from Mr. F. B. Edwards in *The Veterinary Record* of June 10th, 1950, I have received the following figures regarding the tuberculosis position in Denmark, for which I have to thank Mr. E. Skrubbeltrang, Assistant Agricultural Attaché, The Danish Embassy, London. (The population of Denmark is 4,000,000.)

Tuberculosis Pulmonum recorded in Denmark

1920	2,962	1927	2,980	1934	3,350	1941	3,286
1921	3,186	1928	3,878	1935	3,272	1942	3,248
1922	3,017	1929	4,063	1936	3,370	1943	3,348
1923	2,893	1930	3,889	1937	3,500	1944	3,343
1924	3,307	1931	3,926	1938	3,040	1945	3,460
1925	3,417	1932	3,934	1939	2,806	1946	4,122
1926	3,193	1933	3,455	1940	2,687	1947	3,522

It will be seen from these figures that the tendency for human notifications is to increase rather than diminish. The Danes, although tuberculin tested to an extent which includes nearly 95 per cent. of all milk-producing cattle, have a somewhat different method of classification, in that they regard all herds as Tuberculin Tested, but they have a separate register for herds which show no reaction (positive) in any one year.

	Tuberculin-tested herds per cent.	*Reaction-free herds per cent.*
1937	48·5	26·5
1938	61·3	38·0
1939	68·8	45·4
1940	75·8	54·2
1941	81·0	61·7
1942	90·0	71·2
1943	97·0	80·3
1944	98·4	86·3
1945	90·0	91·1
1946	99·3	93·9

It will be noticed from these figures that the war made no difference to the number of T.T. cattle. The scheme was allowed to carry on unhindered, until we reach the stage at about 1943 where to all intents and purposes all the cattle are Tuberculin Tested, and this is where the most marked increase in human notifications becomes evident.

I have written to Jersey and Guernsey for similar figures as they apply there, and these will be sent to you when I receive them.

Yours faithfully,

66, Coningsby Road, High Wycombe, L. Pitcher.

June 17th, 1950.

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R.C.V.S. COUNCIL ELECTION

Sir,—Once again may I, through the medium of your columns, express to those who recorded a vote in my favour my most grateful thanks for this continued support.

I can assure them that, as in the past, I shall do my best to safeguard and advance their interests.

Yours faithfully,

"Rothiemurchus," Winchester. J. F. D. Tutt.

June 23rd, 1950.

Advertiser's Announcement

C. J. Hewlett & Son, Ltd., manufacturing chemists, announce the removal of their Glasgow Depot from 48, Carstairs Street to 216, Orr Street, Glasgow, S.E. Tel.: Bridgeton 3044 (unchanged).